EOS AM-1 FLIGHT OPERATIONS TEAM

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Topics

- Road to Launch Product
- Documentation
- Schedules
- Flight Operations Team (FOT) Support
- Flight Operations Management Approach
- EOC L&EO Support Accommodations

Road to Launch Product

Specific responsibilities for flight operations-related tasks are detailed in the comprehensive "Road to Launch" product, which tracks items such as

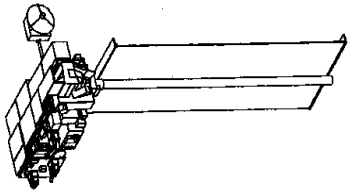
- **Mission support documentation development**
- **Project database (PDB) development**
- **Spacecraft simulator (SSIM) development**
- **Spacecraft Analysis System (SAS) development**
- **Local operational procedure development**
- **Spacecraft command procedure development**
- **Planning and execution of compatibility and interface tests and spacecraft and mission simulations leading to launch readiness**

EOS AM-1
Mission Operations Documentation

Project

~~IPA~~

Institutional arrangements and agreements



S/C Operations

- Flight Systems Manual
- Flight Systems Operations Manual
- On-orbit Operations Manual

Instrument Operations

- OICDs
- Operations Agreements
- Instrument Constaints Data Base

Flight Operations Team

- Standard Operating Procedures
- Training and Certification Plan
- Simulation Plan
- Command and Telemetry Handbook

FOS

- FOS Operations Tools Manual
- IST User's Manual
- Data Format Control Document

EDOS

- EDOS Computer User's Guide
- EDOS DBA User's Guide

DAAC

- DAAC Strategic Management Plan
- Science Data Processing Segment User's Guides
- Science Software Integration and Test (SSI&T) Procedures Documents

System Testing

- EGS Test Plan
- EOS AM-1 End-to-End Test Plan

EGS

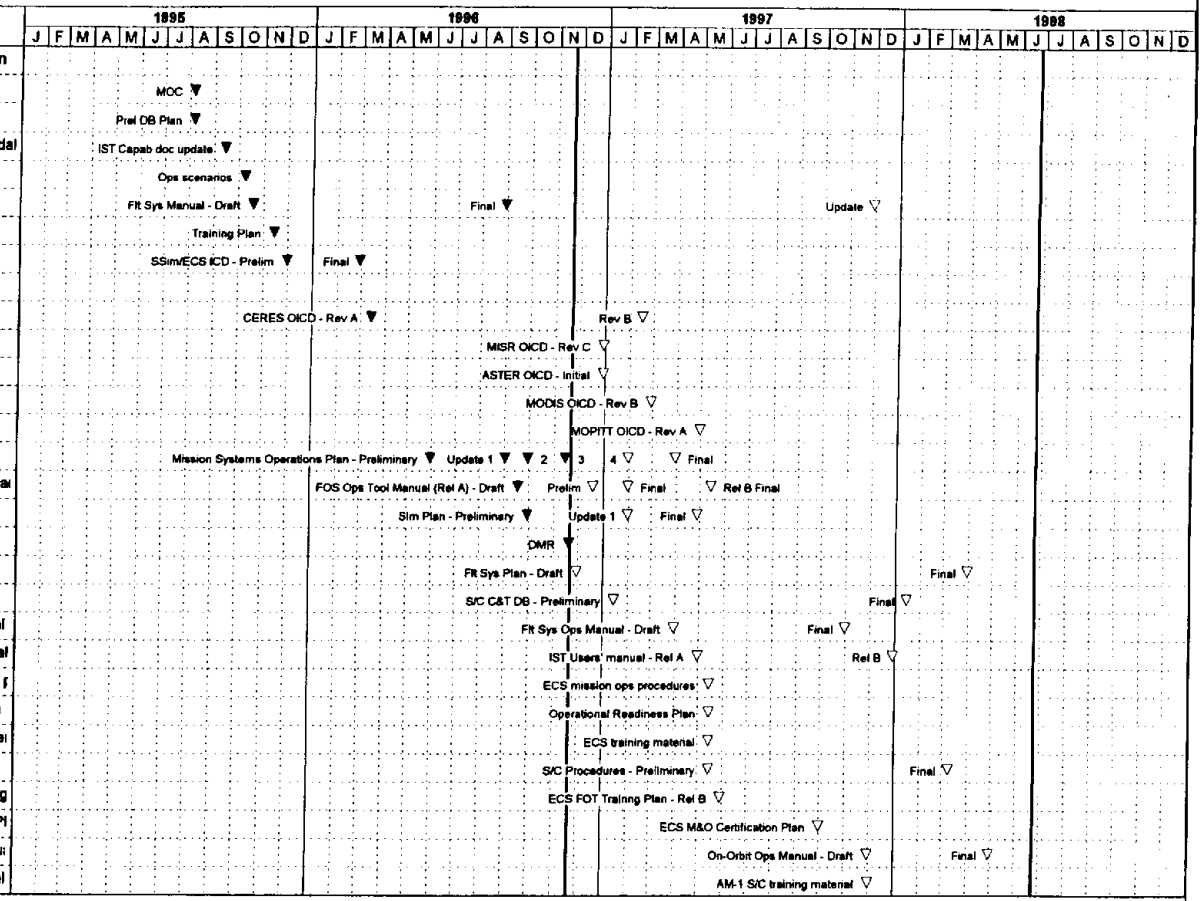
EOS AM-1
Operations Documentation

Goddard Space Flight Center / Code 505
Author: Angie Kelly
Appvl.: Dale Harris

EOS AM-1 Operations Documentation

Orig. Approval:
Last Change: 11/15/96
Status as of: 11/20/96

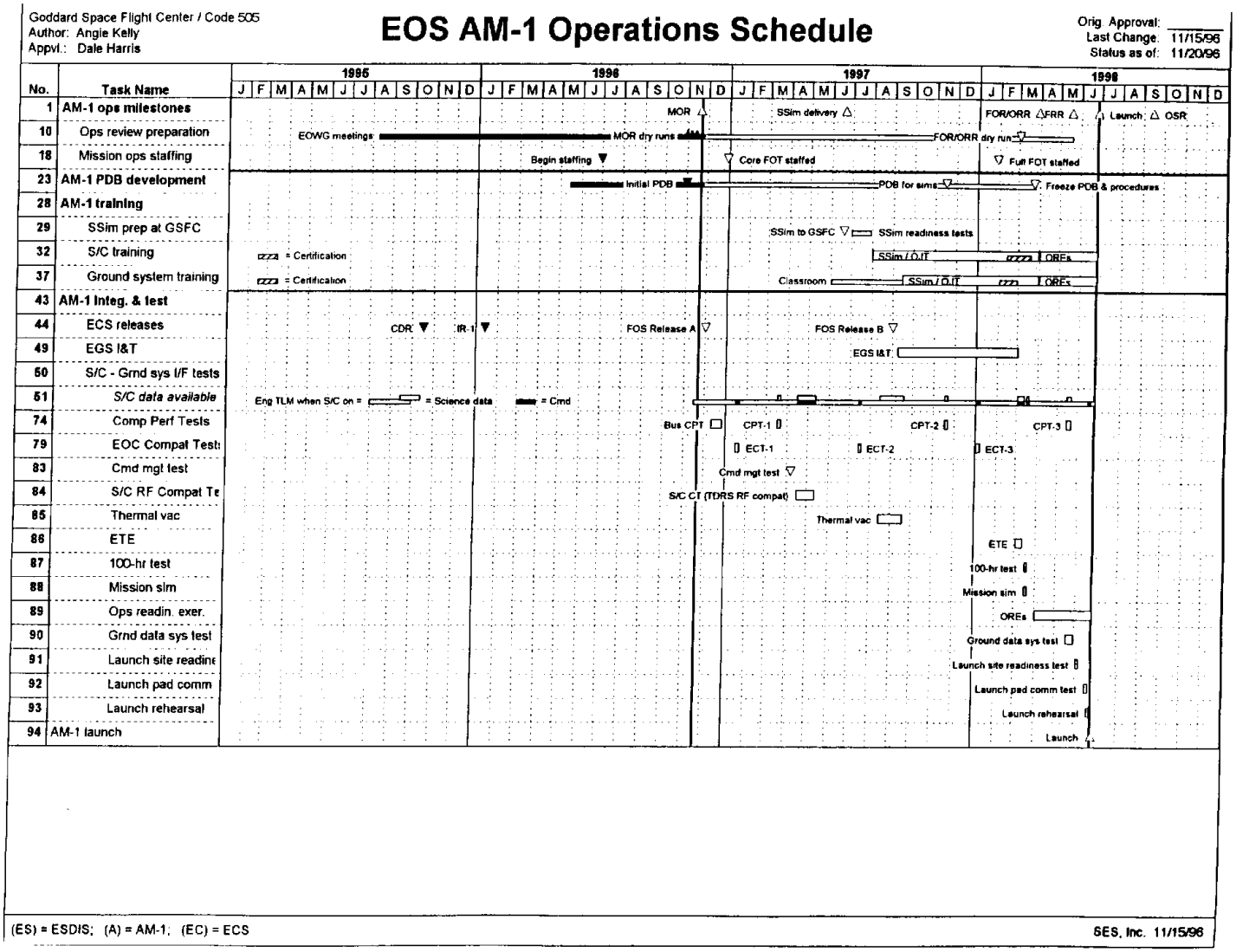
No.	Task Name
95	AM-1 ops documentation
96	(ES) MOC
97	(A) Prelim DB Plan
98	(EC) IST Cap doc updat
99	(EC) Ops scenarios
100	(A) Flight Sys Manual
104	(EC) Training Plan
105	(A) SSim/ECS ICD
108	(A, ES) OICDs
109	(A, ES) CERES
112	(A, ES) MISR
114	(A, ES) ASTER
116	(A, ES) MODIS
118	(A, ES) MOPITT
120	(ES) MSOP
127	(EC) FOS Ops Tool Ma
132	(ES) Sim Plan
136	(ES) DMR
137	(A) Flight Sys Plan
140	(A) S/C C&T DB
143	(A) Flt Sys Ops Manual
146	(EC) IST Users' Manual
149	(EC) ECS mission ops p
150	(EC) Ops Readin. Plan
151	(EC) ECS training mate
152	(A) S/C procedures
155	(EC) ECS FOT Training
156	(EC) ECS M&O Cert. Pl
157	(A) On-Orbit Ops Manu
160	(A) S/C training material



(ES) = ESDIS; (A) = AM-1; (EC) = ECS

SES, Inc. 11/15/96

EOS AM-1 Operations Schedule



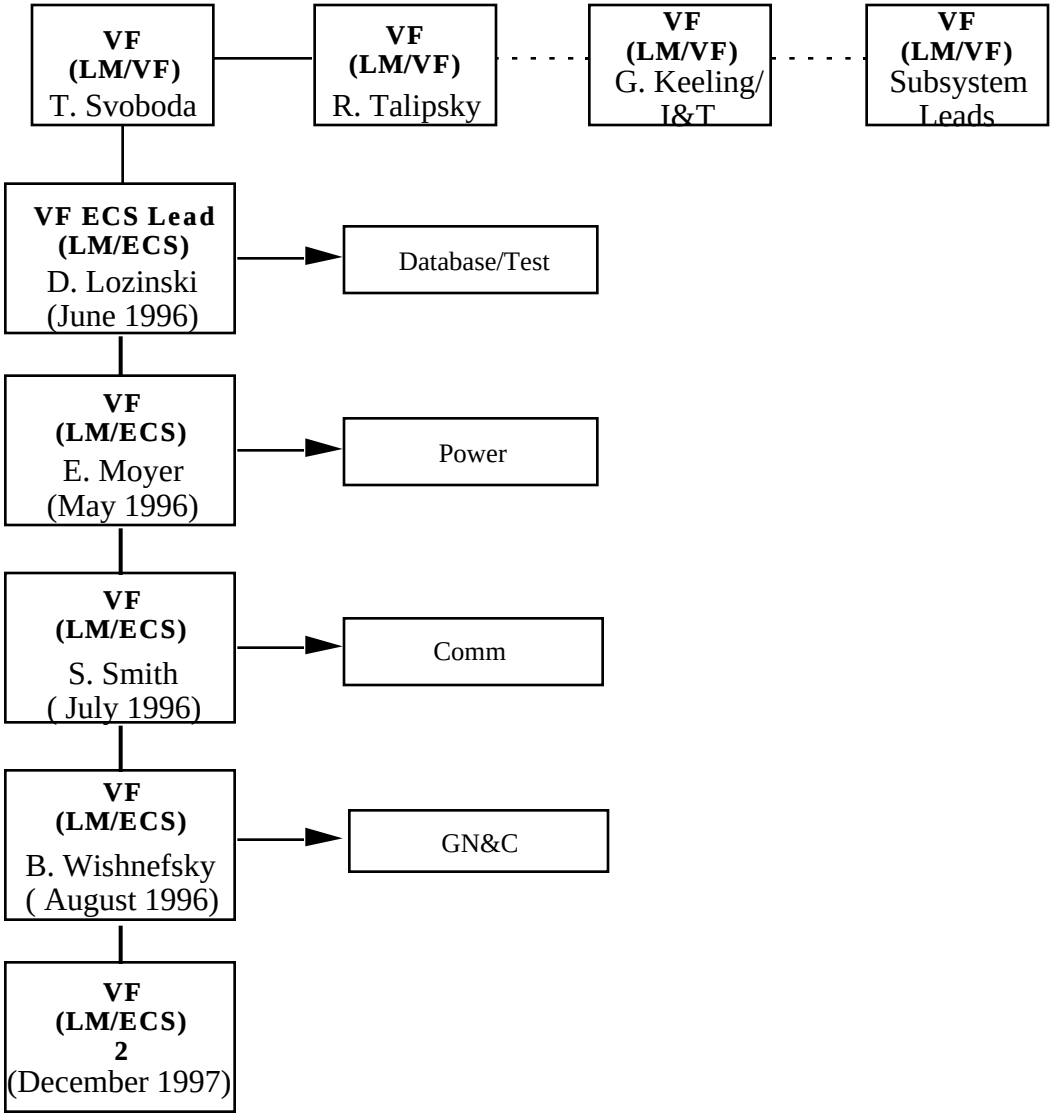
EOS AM-1 Flight Operations Team

- FOT for EOS AM-1 mission is being staffed via the ECS contract
- Lockheed Martin Space Mission Systems (formerly Loral) is subcontracted to Hughes and is responsible for FOT staffing and management
- FOT staffing profile is structured to acquire a core team that achieves the essential skill mix at an early date
  - FOT staff level is increasing to support needs of EOC and requirements for early spacecraft tests
  - First ECT scheduled for January 1997

FOT/Spacecraft Contractor Operations Engineering Team

- Since May 1996, ECS FOT staff have been working onsite with the Operations Engineering group at the spacecraft contractor facility in Valley Forge to optimize transfer of spacecraft subsystem knowledge to the ECS FOT
- Purpose
  - Work closely with spacecraft subsystem engineers and I&T personnel to gain familiarity with EOS AM-1 spacecraft subsystems and facilitate definition of subsystem operational scenarios
  - Play key role in development of products describing activation, checkout, and nominal operations of all subsystems onboard EOS AM-1 spacecraft
  - Function as knowledge-based engineering resource for local FOT staff engineers on returning from Valley Forge

Valley Forge
Flight Operations Staff



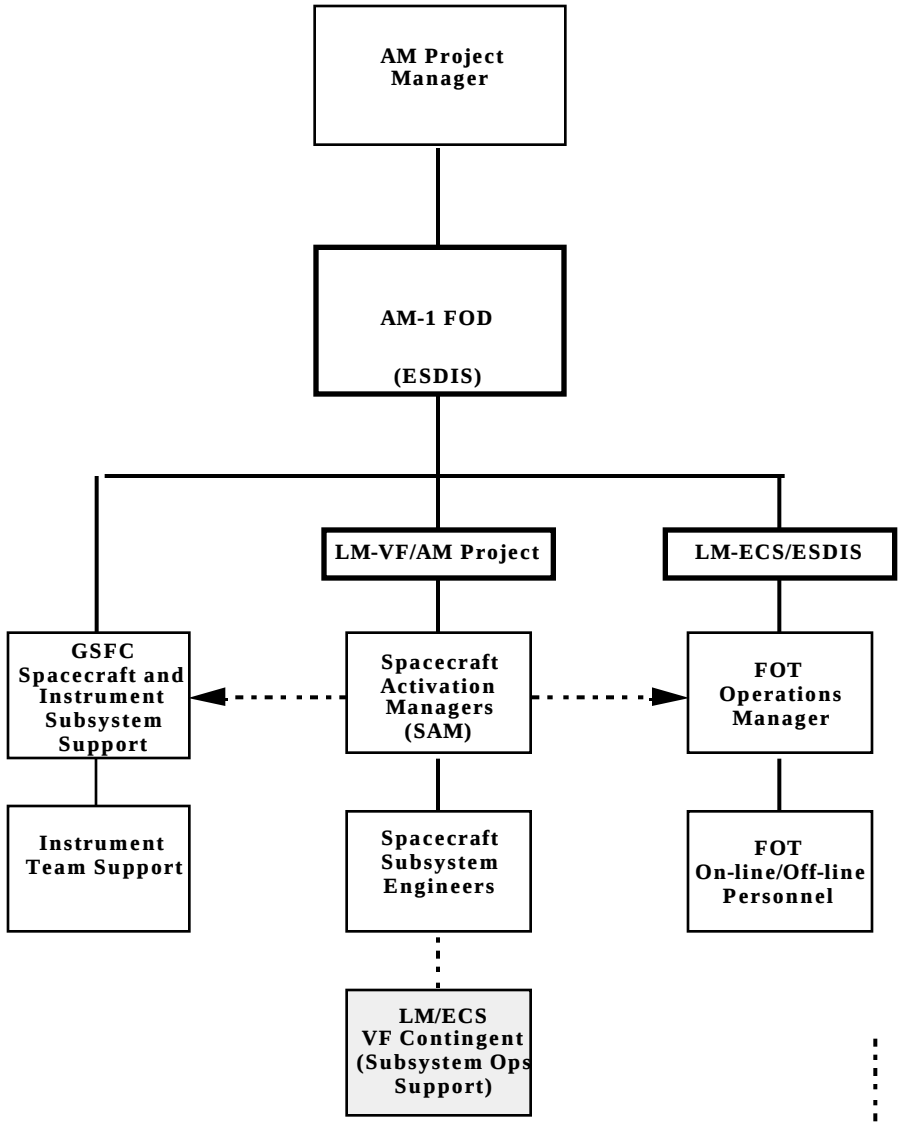
EOC Support on Return From Valley Forge

- **ECS Valley Forge support staff will undertake the following EOS AM-1 tasks in the EOC upon returning to GSFC from Valley Forge:**
  - **Acquire skill in operation of FOS software**
  - **Populate Decision Support System (DSS)**
  - **Assist in training spacecraft evaluators and engineers in functionality of spacecraft subsystems**
  - **Provide support to Valley Forge spacecraft engineers residing at GSFC for L&EO period**
  - **Function in sustaining engineering capacity as AM-1 mission matures**

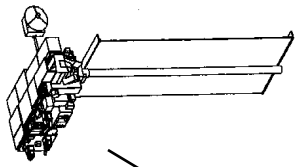
Flight Operations Management Approach

- L&EO phase
  - AM Project and Lockheed Martin Valley Forge (LMVF) have overall responsibility for delivery of fully operational on-orbit AM-1 spacecraft
  - ESDIS Project is responsible for providing a fully functional EOC and an FOT staff capable of supporting AM-1 spacecraft operations beginning with L&EO activation and checkout phase
  - Valley Forge provides Spacecraft Activation Managers (SAMs) who have responsibility for executing on-orbit activation and checkout program
  - Valley Forge provides spacecraft subsystem engineers to work at GSFC to support full activation and checkout of EOS AM-1 spacecraft

L&EO Operations Management Hierarchy



L&EO Anomaly Resolution Process



Spacecraft anomaly detected by FOT/SE

FOT/SE discuss anomaly with SAM

SAM makes decision to proceed or to halt activation timeline activities

SAM advises FOD/ AM Project of anomaly and decision to halt timeline activities

SAM convenes Anomaly Resolution Team (ART)

ART determines course of action to diagnose/resolve anomaly

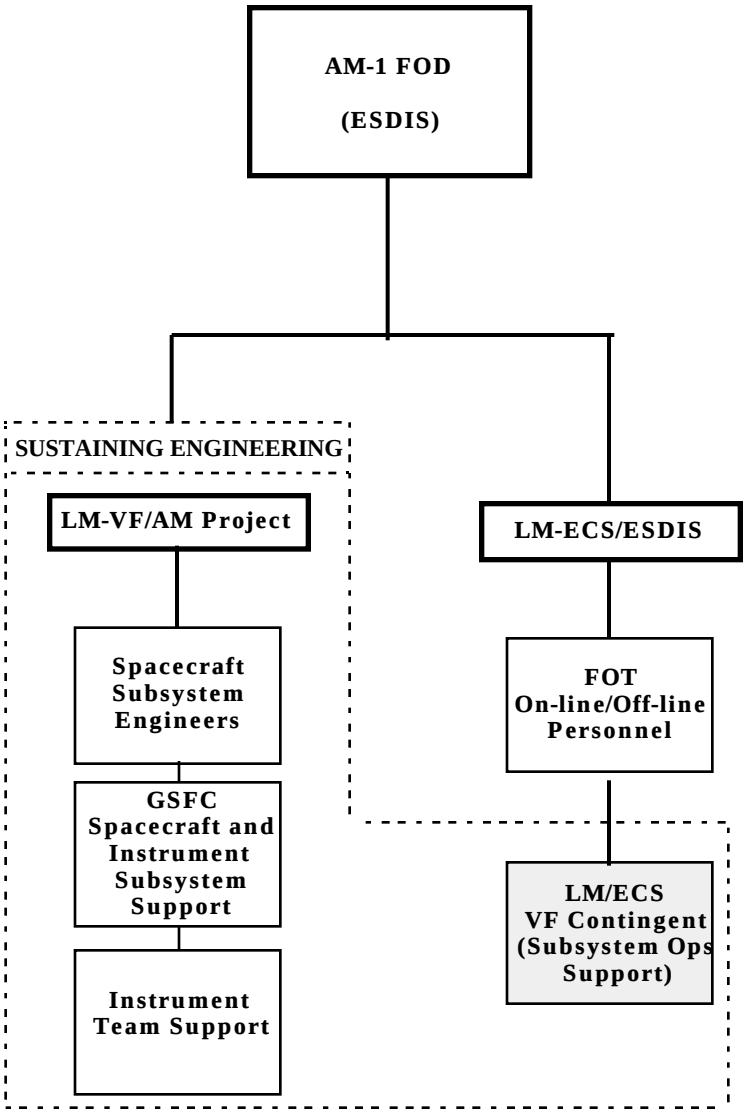
Timeline/script updates implemented by FOT

Anomaly resolution and timeline activities are resumed by SAM/FOT

Flight Operations Management Approach

- Mature operations phase
  - ESDIS management and ECS Lockheed Martin FOT assume full operational responsibility for EOS AM-1 spacecraft
  - LMVF sustaining engineering option (until L+14 months) will allow special on-call coverage to be obtained for major spacecraft anomalies or emergencies
  - Additional sustaining engineering options extend to L+3 years

Mature Operations Management Hierarchy



EOC L&EO Support Accommodations

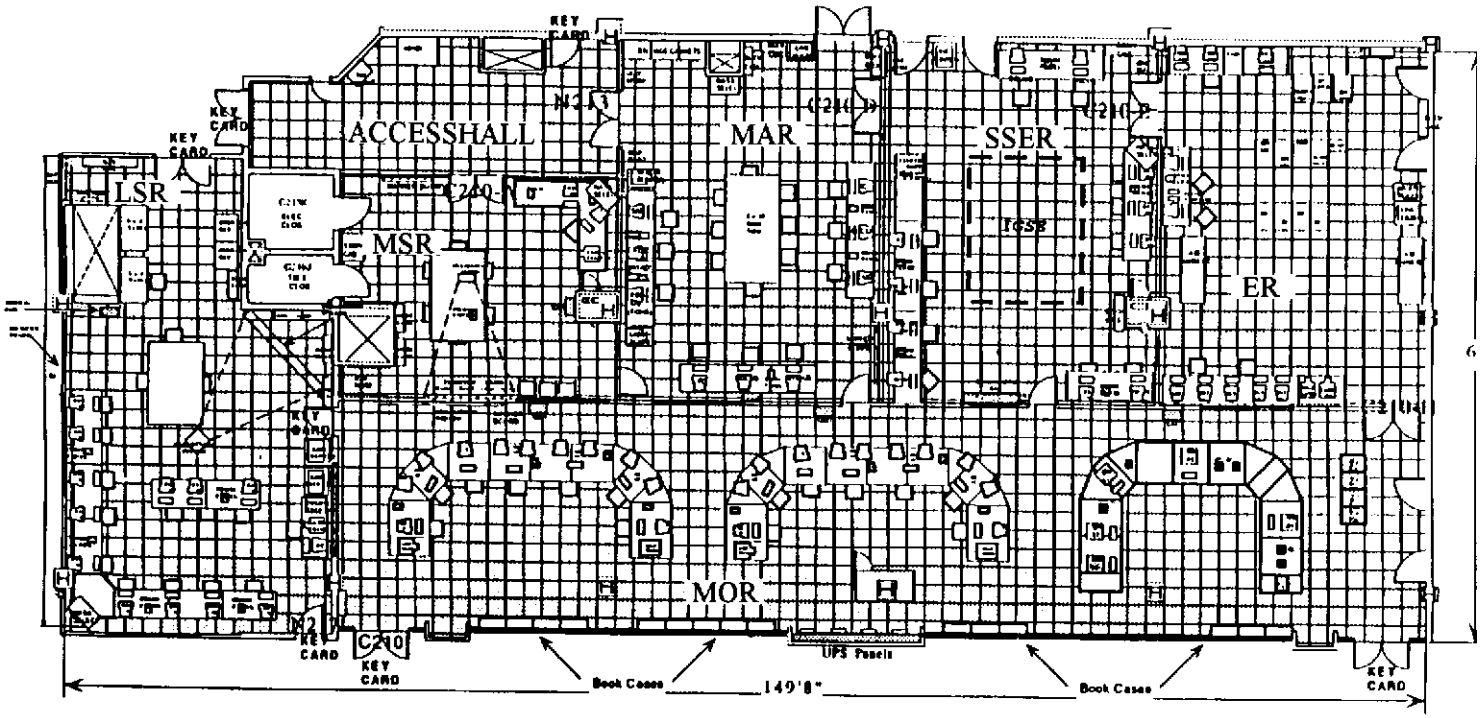
- Accommodations will be provided for support personnel in EOC during spacecraft activation and checkout
  - AM-1 spacecraft engineers
  - Instrument operations personnel
  - FDD engineers
- Support personnel will be located primarily in one of three areas
  - Launch Support Room (LSR)
  - Simulation and Sustaining Engineering Room (SSER)
  - Mission Operations Room (MOR)

EOC Facility Layout

RELEASE "B"
6/21/96

EOC FACILITY

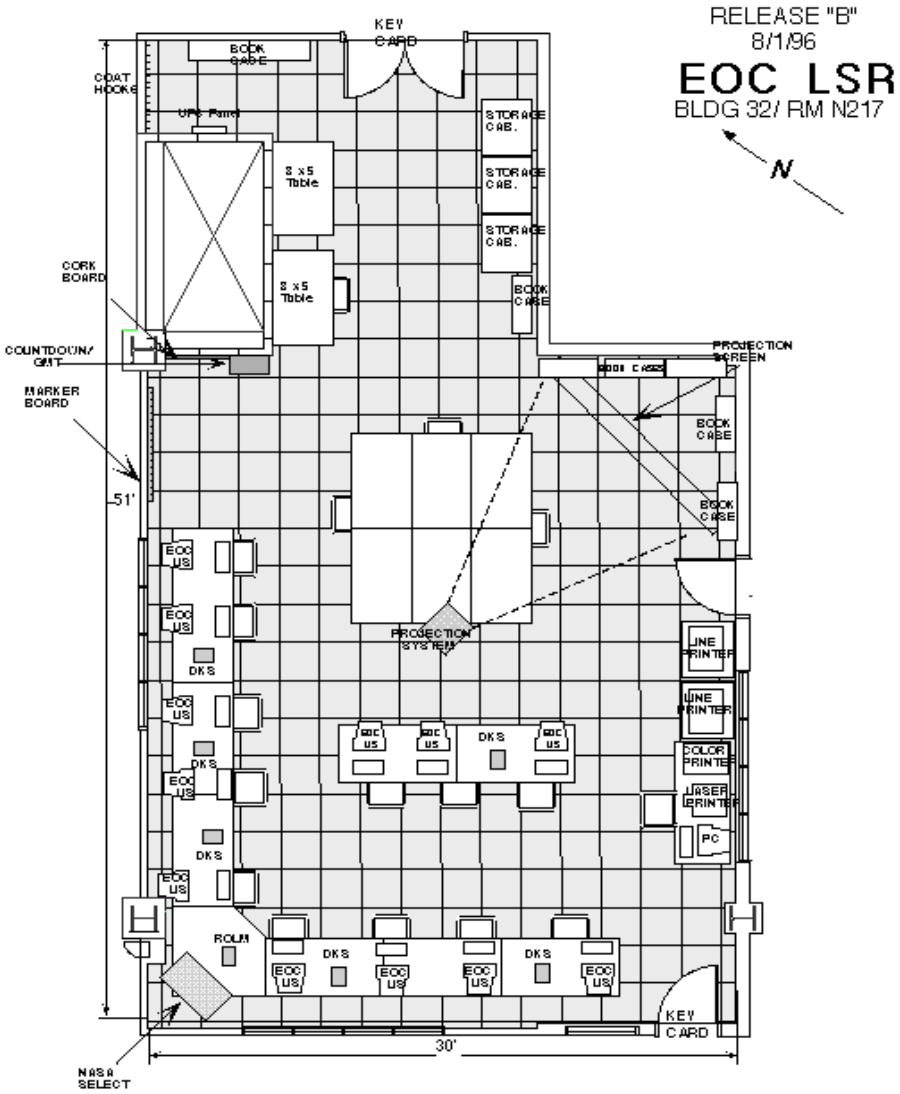
BLDG 32



EOC L&EO Support Accommodations: LSR

- LSR will be used by AM-1 spacecraft engineers during L&EO checkout
- AM-1 engineers will be provided with FOT userstations to view and analyze spacecraft health and safety data
- Additional LSR equipment includes key sets, desks or work tables, shelves, and cabinets for documentation
- LSR is sized to accommodate 24 spacecraft engineers (12 user workstations)
- After L&EO, LSR will be used to support ground system testing and training, sustaining engineering, and anomaly investigation

EOC L&EO Support Accommodations: LSR



EOC L&EO Support Accommodations: MOR

- MOR is used by FOT as central point for command and control of EOS AM-1 spacecraft
- Primary operations bay is located adjacent to LSR
- Middle operations bay will be used initially as simulations area for EOS AM-1 FOT; will ultimately be used in multimission support
- Third operations bay (near equipment room) will be used by EDOS operations personnel
- FDD personnel will be located in primary operations bay during initial spacecraft orbit adjust maneuvers
- Mission Analysis Room (MAR) will support additional offline analysis functions and house FDD support personnel during majority of L&EO period

EOC L&EO Support Accommodations: MOR

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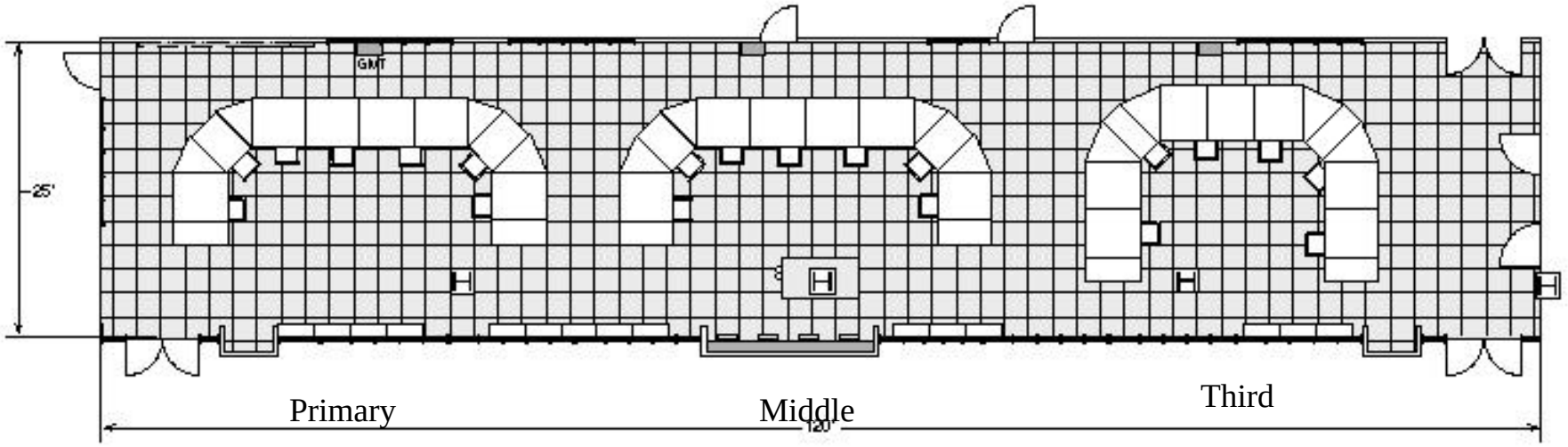
8/1/96

EOC MOR

BLDG 32/ RM C210



EOC L&EO Support Accommodations: SSER

- IOTs will be located primarily in SSER during L&EO
- IOTs will be supplied with FOT userstations (functionally equivalent to IST)
- Instrument operations team may elect to bring IGSE to augment FOT userstation capabilities for instrument activation and checkout
- Additional SSER equipment includes key sets, desks or work tables, shelves, and cabinets for documentation
- SSER sized to accommodate all five IOTs (5 to 7 persons per IOT)

EOC L&EO Support Accommodations: SSER